

Perkins

100 SERIES

Operating Instructions

PLEASE READ THIS DOCUMENT CAREFULLY BEFORE STARTING THE ENGINE.

STARTING THE ENGINE

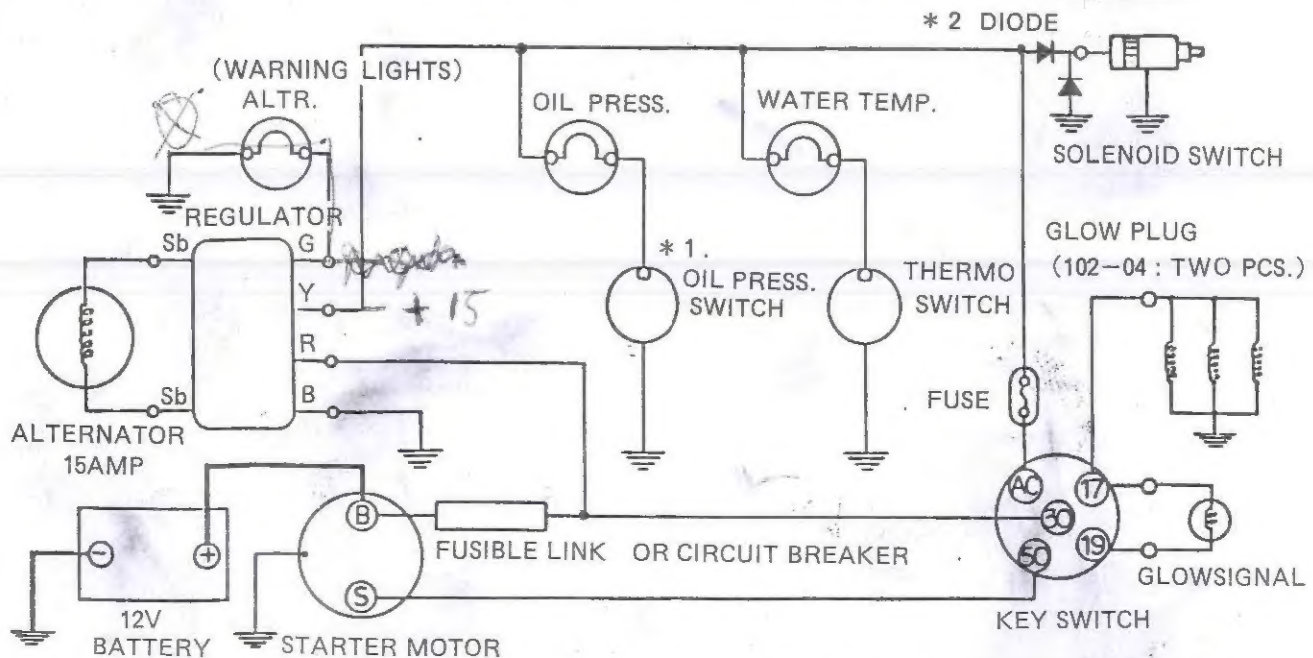
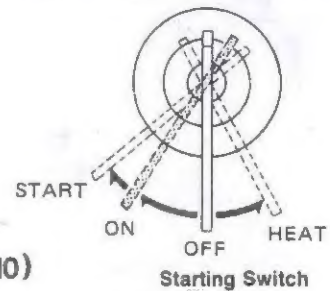
1. Move throttle lever to full-speed position.
2. Turn key anticlockwise to "HEAT" and hold it there for 20 to 30 seconds (maximum 60 seconds) until the glow signal starts glowing red.*
3. With the signal glowing red, turn the key clockwise all the way to "START" and crank the engine (maximum 20 seconds).
4. When the engine fires, release the key which will spring back to "ON".
5. Turn throttle lever down slowly to allow the engine to idle.

* Note: If the glow signal fails to glow in 20 to 30 seconds or glows rapidly (2 to 3 seconds) this indicates a malfunction of the cold start system.

⚠ Ether or other starting fluids **must not** be used with these engines.

TYPICAL WIRING DIAGRAM

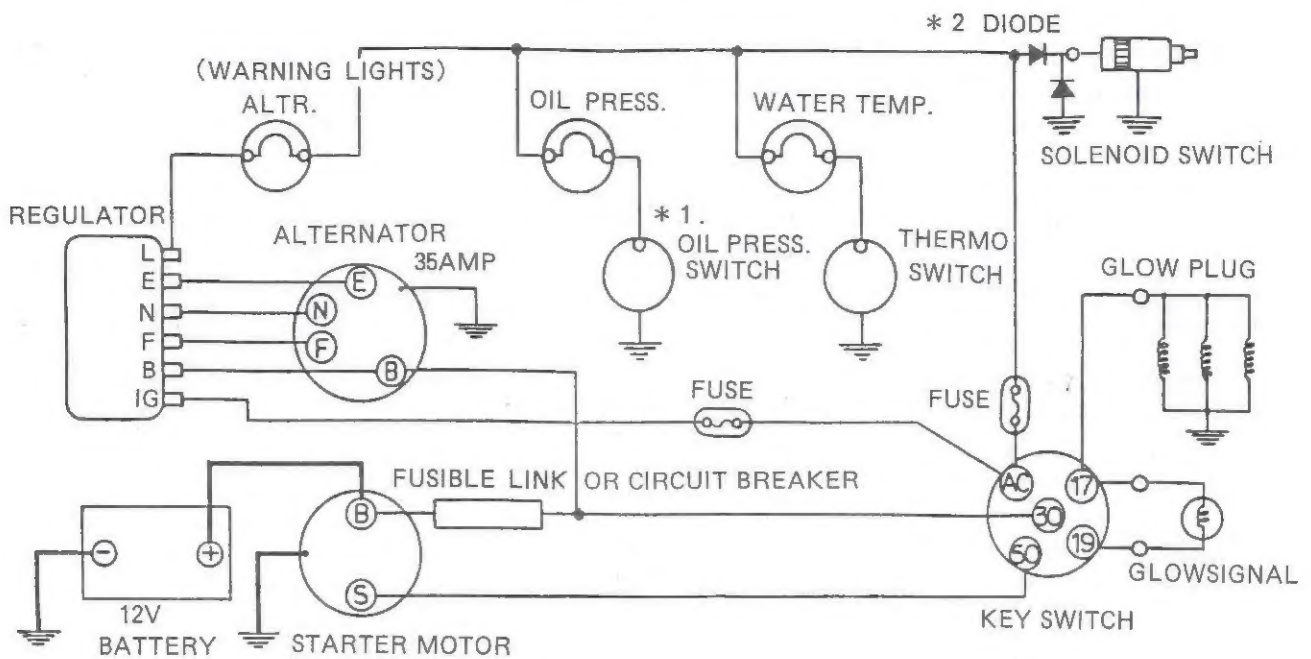
(102-04,102-05,103-06,103-07,103-09,103-10)



* 1. MAX CURRENT DRAW FOR STANDARD OIL PRESSURE SWITCH IS 0.42amps (5 Watt max bulb)

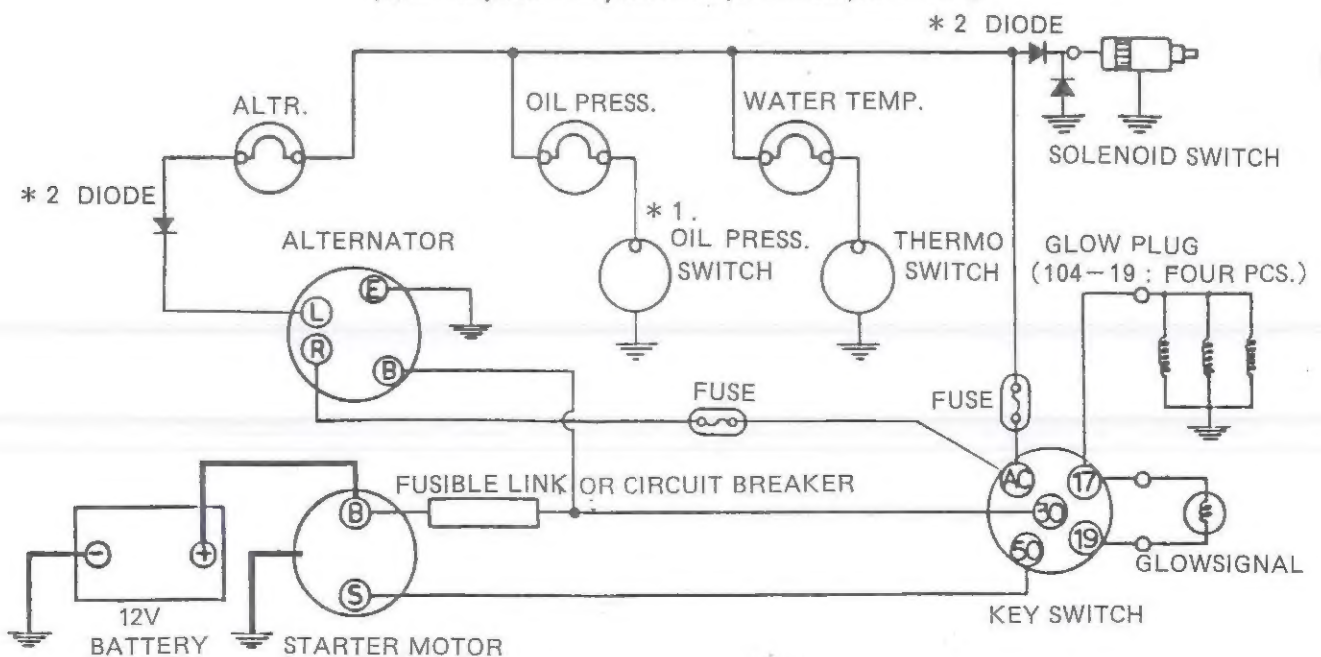
* 2. DIODE Capacity : Current 3 A. Reverse Voltage 600V.

TYPICAL WIRING DIAGRAM (103-09, 103-10)



* 1. MAX CURRENT DRAW FOR STANDARD OIL PRESSURE SWITCH IS 0.42 amps
(5 Watt max bulb)

TYPICAL WIRING DIAGRAM
(103-12, 103-13, 103-15, 104-19, 104-22)



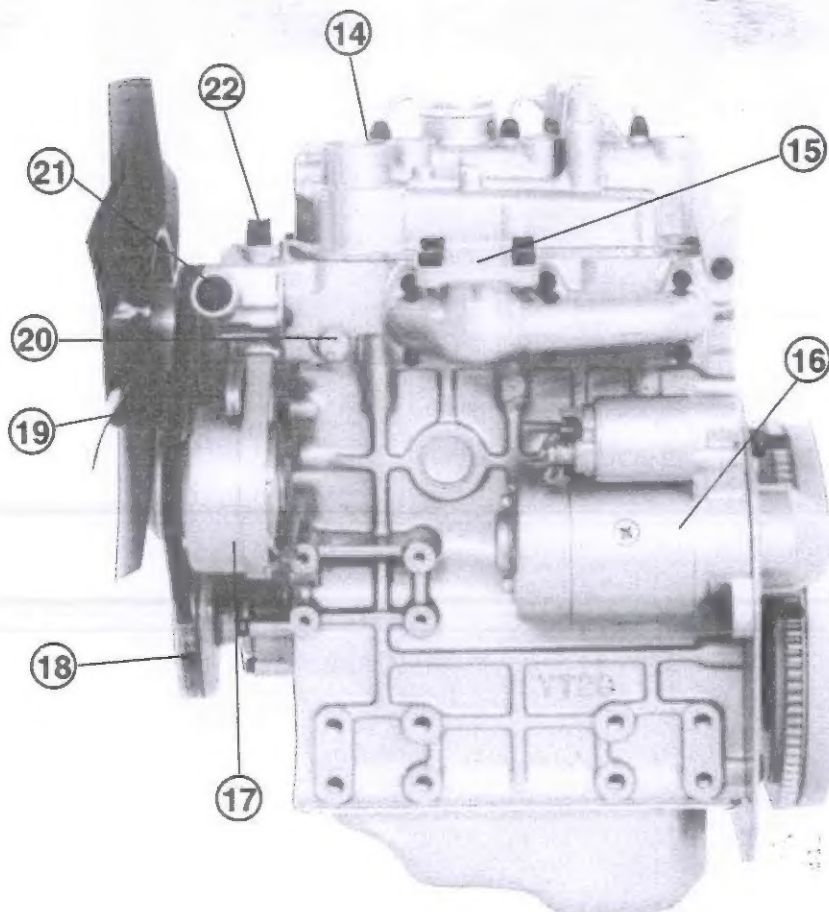
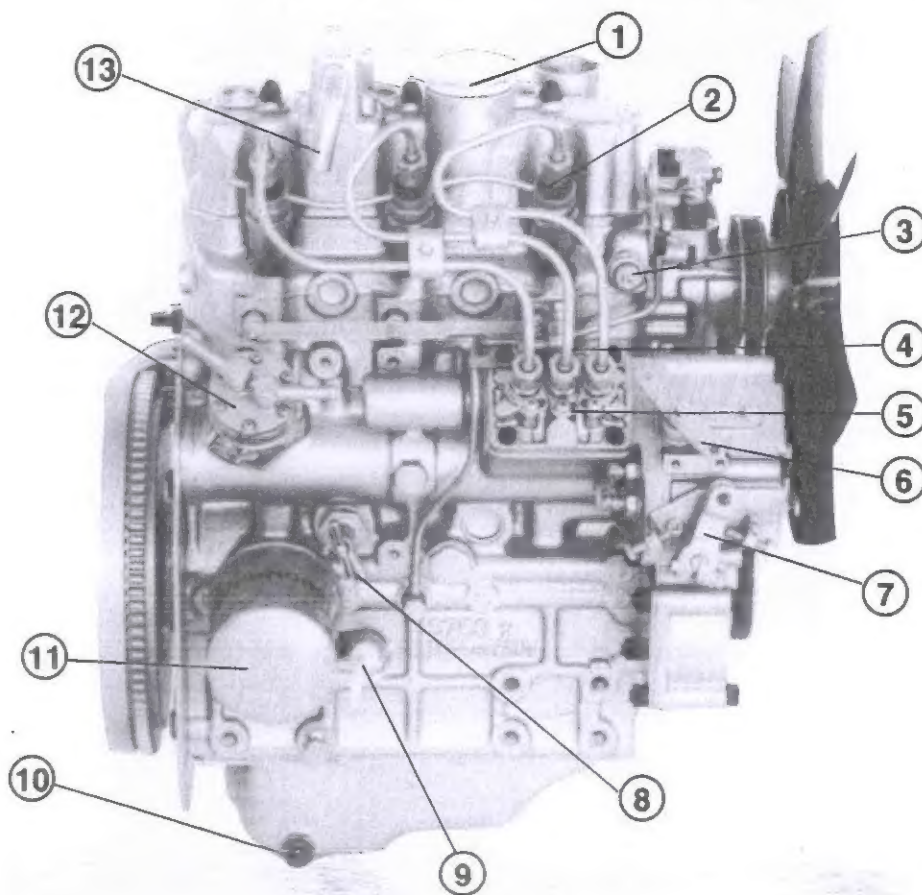
* 2 REMARKS

DIODE Capacity : Current 3 A. Reverse voltage 600V.

LOCATION OF ENGINE PARTS

Right hand side view

- 1 Filler cap for lubricating oil
- 2 Atomiser
- 3 Oil pressure switch
- 4 Position of engine number label
- 5 Fuel injection pump
- 6 Mechanical stop control (Electrical stop control at rear of pump)
- 7 Throttle lever
- 8 Coolant drain tap
- 9 Lubricating oil dipstick
- 10 Lubricating oil drain plug
- 11 Lubricating oil filter
- 12 Fuel lift pump
- 13 Open engine breather



Left hand side view

- 14 Induction manifold
- 15 Exhaust manifold
- 16 Starter motor
- 17 Alternator
- 18 Crankshaft pulley
- 19 Fan, mounted on water pump
- 20 Water temperature switch
- 21 Water outlet
- 22 Heater connections

PREVENTIVE MAINTENANCE

The schedules which follow must be applied at the interval (hours or months) which occurs first.

| Every Day or every 8 hours | | | | | |
|--------------------------------|---|---|---|---|---|
| First Service - (20/ 50 hours) | | | | | |
| Every 100 hrs or 3 months | | | | | |
| Every 200 hrs or 6 months | | | | | |
| Every 400 hrs or 12 months | | | | | |
| Every 600 hrs or 18 months | | | | | |
| ● | ● | ● | ● | ● | Check level of coolant (Top up with coolant only) |
| | | | | ● | Check concentration of coolant |
| | | | | ● | Renew coolant (FILL SLOWLY, ENSURE CORRECT QUANTITY IS USED) |
| ● | | ● | ● | ● | Check engine lubricating oil level |
| | ● | ● | ● | ● | Renew engine lubricating oil (FILL SLOWLY, ENSURE CORRECT QUANTITY IS USED) |
| | ● | ● | ● | ● | Renew engine oil filter |
| | ● | ● | ● | ● | Drain water from fuel filter and pre-filter |
| | | ● | ● | ● | Renew fuel filter canister (N.B. Air vent screws on filter and fuel pump) |
| ● | ● | ● | ● | ● | Check tension of alternator drive belt |
| | | | | ● | Check alternator drive belt for wear |
| | | | | ● | Renew alternator drive belt |
| | | ● | ● | | Check and adjust idle speed |
| | | | | ● | Tighten cylinder head |
| | | | | ● | Check and adjust valve clearances |
| | | | | ● | Check electrical systems |
| | | | | ● | Check all nuts/bolts for tightness |
| | | | | ● | Check injectors for performance |
| | ● | ● | ● | ● | Clean air filter (earlier check may be necessary) |
| | | | | ● | Renew air filter element |
| ● | ● | ● | ● | ● | Check and correct any leaks or engine damage |

Above operations to be carried out by trained personnel with reference to the workshop manual where necessary. These preventive maintenance periods apply to average conditions of operation. Check the periods given by the manufacturer of the equipment in which the engine is installed. If necessary use shorter periods.

GENERAL DATA

| ENGINE TYPE ENGINE CODE | 102-04 KA | 102-05 KN | 103-06 KB | 103-07 KL | 103-09 KC | 103-10 KD | 103-12 KG | 103-13 KH | 103-15 KE | 104-19 KF | 104-22 KR |
|---|---|--------------|-----------------|--------------|--------------|--------------|-----------------|--------------|--------------|-------------------|-------------------|
| COMBUSTION SYSTEM | IDI | IDI | IDI | IDI | IDI | IDI | IDI | IDI | IDI | IDI | IDI |
| NUMBER OF CYLINDERS | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| CUBIC CAPACITY (LITRES) | 0.411 | 0.451 | 0.617 | 0.676 | 0.879 | 0.954 | 1.267 | 1.330 | 1.496 | 1.995 | 2.216 |
| CAPACITY OF INDUSTRIAL OIL SUMP AND FILTER (LITRES) | | | | | | | | | | | |
| MAXIMUM | 1.9 | 1.9 | 2.8 | 2.8 | 3.5 | 3.5 | 5.7 | 5.7 | 5.7 | 6.5 ^{*2} | 7.1 ^{*2} |
| MINIMUM | 1.3 | 1.3 | 2.1 | 2.1 | 2.7 | 2.7 | 4.5 | 4.5 | 4.5 | 5.1 ^{*2} | 6.1 ^{*2} |
| TYPICAL LUBRICATING OIL SPECIFICATION | API CC/SE OR API CD/SE* VISCOSITY SAE IOW-30 (Depending on temperature) (*Not recommended during first 50 hours of operation) | | | | | | | | | | |
| COOLANT SYSTEM CAPACITY (engine only) LITRES | 0.98 | 0.98 | 1.25 | 1.25 | 1.70 | 1.70 | 2.50 | 2.50 | 2.65 | 3.3 | 3.6 |
| COOLANT SPECIFICATION *1 | Cleansoftwater with no more than 50% <i>antifreeze concentration</i> -ethanediolbase/ ethylene glycol, corrosion inhibitor to BS 6850 : 1985 or ASTM D 3306-74 or AS 2108-1977 | | | | | | | | | | |
| DIESEL FUEL SPECIFICATION | Minimum cetane number 45. (<i>Aviation fuel JP4 must not be used</i>) | | | | | | | | | | |
| DIRECTION OF ROTATION | Clockwise viewed from the front (Water pump end) | | | | | | | | | | |
| CYLINDER HEAD TORQUES Kgfm (lbf ft) | 3.5-4.0 (25-29) | | 5.0-5.3 (36-38) | | | | 9.0-9.5 (65-69) | | | | |
| TAPPET SETTINGS COLD INLET/EXHAUST | 0.2mm(0.008 inch) | | | | | | | | | | |

*1. FOR THOSE LOCATIONS WHERE THERE IS NO RISK OF FREEZING, IT IS NOT ESSENTIAL TO USE ANTIFREEZE. HOWEVER ANTIFREEZE DOES HAVE USEFUL INHIBITING PROPERTIES. FOR FROST PROTECTION DOWN TO -36°C, A MAXIMUM CONCENTRATION OF 50% ANTIFREEZE MAY BE USED. HOWEVER ANTIFREEZE MIXTURE CAN ELEVATE COOLANT TEMPERATURES, THE EFFECT OF WHICH WILL GENERALLY INCREASE AS THE ANTIFREEZE CONCENTRATION INCREASES. IT IS THEREFORE IMPORTANT THAT THE ORIGINAL RADIATOR SELECTION TAKES ALL INTENDED OPERATING CONDITIONS INTO ACCOUNT.

* 2 With Balancer

| | | | | |
|------------------|-----|-------------|--------|--------|
| Without Balancer | are | ENGINE TYPE | 104-19 | 104-22 |
| | | Maximum | 7.1 | 8.2 |
| | | Minimum | 5.3 | 6.3 |

SAFETY PRECAUTIONS

These safety precautions are important. You must refer also to the local regulations in the country of use.

- Do not use these engines in marine applications.
- Do not change the specification of the engine.
- Do not smoke when you put fuel in the tank.
- Clean away fuel which has been spilt. Material which has been contaminated by fuel must be moved to a safe place.
- Do not put fuel in the tank while the engine runs (unless it is absolutely necessary).
- Do not clean, add lubricating oil, or adjust the engine while it runs (unless you have had the correct training; even then extreme caution must be used to prevent injury).
- Do not make adjustments that you do not understand.
- Ensure that the engine does not run in a location where it can cause a concentration of toxic emissions.
- Other persons must be kept at a safe distance while the engine or equipment is in operation.
- Do not permit loose clothing or long hair near moving parts.
- Keep away from moving parts during engine operation. **Attention:** The fan cannot be seen clearly while the engine runs.
- Do not operate the engine if a safety guard has been removed.
- Do not remove the filler cap of the cooling system while the engine is hot and while the coolant is under pressure, because dangerous hot coolant can be discharged.
- Do not use salt water or any other coolant which can cause corrosion in the cooling system.
- Do not allow sparks or fire near the batteries (especially when the batteries are on charge) because the gases from the electrolyte are highly flammable. The battery fluid is dangerous to the skin and especially to the eyes.
- Disconnect the battery terminals before a repair is made to the electrical system.
- Only one person must control the engine.
- Ensure that the engine is operated only from the control panel or from the operator's position.
- If your skin comes into contact with high-pressure fuel, obtain medical assistance immediately.
- Diesel fuel and used engine oils can damage the skin of certain persons. Protect your hands with gloves or a special solution to protect the skin.
- Do not move mobile equipment if the brakes are not in good condition.
- Ensure that the control lever of the transmission drive is in the "out-of-drive" position before the engine is started.
- Fit only genuine Perkins parts.
- Do not use ether or other starting fluids to start these engines.
- Do not use more than 50% antifreeze concentration by volume at high ambients, otherwise engine damage will result.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

COOLANT—IF A MACHINE WHICH HAS BEEN PREPARED FOR LOW AMBIENT TEMPERATURE OPERATION—IS MOVED TO A HIGH AMBIENT AREA (+20°C) THE CONCENTRATION OF ANTIFREEZE SHOULD BE REVIEWED.

| Lowest temperature of protection needed | % Volume of POWERPART antifreeze | Mixture ratio by volume POWERPART antifreeze: water |
|---|----------------------------------|---|
| -12°C (10°F) | 25 | 1 : 3 |
| -18°C (0°F) | 33 | 1 : 2 |
| -25°C (-13°F) | 40 | 1 : 1.5 |
| -37°C (-34°F) | 50 | 1 : 1 |

 **Perkins**
Engines

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